Nova Scotia Green Roof Manual

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"Green Roof Manual"

The Green Roof Manual aims to outline various law and policy tools available to municipalities in Nova Scotia in order to increase the construction and use of green roofs in the province. It has been designed to speak to a wide audience, ranging from citizens to city councilors, in an effort to assist communities in promoting green roof initiatives.

This manual is comprised of four parts. Part I explains the nature and benefits of green roofs. Part II summarizes the various regulatory measures that municipalities can use to promote the construction and use of green roofs. Part III outlines how numerous North American cities have implemented these measures. Part IV identifies sections of the Charter, the legislation that governs municipalities in Nova Scotia, that authorize the various measures summarized in Part II.

It is our belief that green roofs can provide for a harmonious integration of urban and "non-urban" ecosystems. Green roofs can reduce the environmental impacts of urbanization, and promote the efficacy and efficiency of urban systems, such as storm-water management.

Contributors

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PART I
What are Green Roofs?

Description of Green Roofs

Green roofs can be examined from a variety of perspectives. From an ecological perspective, they are ecosystems containing three main components: the engineered structures which include various membranes that protect the roof surface, the growing medium which provides substrate for the vegetation component, and the vegetation itself which can include a variety of vascular plants, mosses and lichens. From a building perspective, a green roof is basically a roofing assembly combining elements of traditional roofs such as a waterproofing membrane, with other membranes providing services such as drainage, root barriers and/or insulation, with growing medium and vegetation. Green roofs are typically divided into two main types that differ in the depth of growing medium. Extensive green roofs typically have shallow growing medium (<20cm) and are deployed primarily for environmental benefits. They involve lightweight roofing assemblies and are appropriate for many retrofits as well as any situation where a large amount of roof needs to be covered at the lowest cost. Intensive green roofs or roof gardens use deeper growing medium and can support more types of vegetation than extensive roofs. These have greater weight loads on the buildings so reinforcement is often necessary. Intensive green roofs are more typically used for outdoor recreation or general amenity space and require more maintenance because of the types of vegetation typically used (often shrubs and trees).

Benefits of Green Roofs

Green roofs provide a variety of benefits, some of which correspond to the services provided by any urban vegetation (such as stormwater capture) and some which are unique to green roofs (building energy savings). The two most economically important benefits provided by green roofs are storm-water capture and rooftop cooling. Green roof vegetation and substrates reduce the amount of water running off the roof during rainstorms by up to 100%. The magnitude of this benefit depends on the depth of the substrate, the type of vegetation, the slope of the roof and the size of the storm. This is a valuable function in that reductions in the amount of runoff can in turn reduce the amount of storm-water infrastructure required, reduce erosion in urban waterways, and prevent contaminants from reaching natural waterways. In the case of HRM, green roofs have the potential to reduce the number of combined sewer overflow events, thus less sewage would flow untreated into the harbour. Runoff and erosion are large problems as well in the surrounding surburban areas of HRM, where new developments have been associated with pollution loading into streams containing Atlantic salmon or other fish species.

Green roofs cool rooftops in the summer, resulting in lower building energy expenditures and amelioration of the urban heat island. The cooling function of green roofs derives from increased albedo (reflectivity) of the vegetation relative to dark surfaces such as pavement or conventional rooftops, transpiration by plants, and evaporation from the growing medium. Some additional thermal benefits come from insulation layers, but these insulation layers are typically a component of other roof types as well. Any building in which residents use some form of cooling technology, whether central air conditioning, window-mounted air conditioning or fans, will likely have some reduction in summer energy consumption after green roof installation. The greatest cooling benefits affect the top two floors of the building, so the building-wide reductions are anticipated to be most significant for buildings with a high roof:wall ratio (low, wide buildings). There are some winter thermal benefits anticipated as well, although these have only been subjected to a handful of studies. One study in Ottawa showed reduced heat loss through the roof in winter under a green roof compared with a conventional roof and research is ongoing in Halifax. Modeling studies have shown that when many of the roofs in an urban area are greened, reductions to the urban heat island (higher temperatures in the city relative to surrounding rural areas) can be significant.

Green roofs also reduce airborne pollution through trapping of particulates and direct plant uptake. These benefits are less well known than the thermal and hyrdrological benefits. Green roofs are installed to provide visual relief in urban areas, they can produce food and they provide extra green space for recreation and habitat for wildlife. One of the earliest efforts to establish green roofs occurred in Germany in the 1800s and was based on their ability to reduce the flammability of wooden buildings. Overall, perhaps the most significant benefit of green roofs is that they provide a set of functions that is not captured by any other single building technology. For example, rooftop cooling can be achieved using highly reflective roofs or "evaporative roofs" whereby water is sprayed onto the surface to allow for continuous evaporative cooling, but these roofs provide no storm-water retention or habitat. Green roofs can also be productively combined with other green technology. Photovoltaic arrays function optimally at relatively low temperatures, so pairing these with green roofs can optimize energy production by the roof.

PART II
What Tools do Municipalities have to Encourage the Use of Green Roofs?

This Part summarizes the various law and policy measures that have been used by municipalities in North America to promote the construction and use of green roofs. These initiatives can be grouped into three main categories: direct and indirect incentives and regulatory requirements. Because decisions about land-use planning and development require balancing of multiple interests, the benefits and draw backs associated with the use of the regulatory measures listed below will be examined.

Direct Incentives

Green roofs often require a higher upfront cost than conventional roofs. Thus, the idea behind direct incentives is that by reducing this financial burden, municipalities can make green roofs more affordable and more attractive as an investment to both homeowners and businesses.

Financial assistance

Outright financial incentives are often based on policy decisions made by a municipality. For instance, a municipality could provide grants to help cover the costs of green roof construction. Usually, these types of grants are provided in proportion to the amount of square footage of the green roof. The larger the square footage, the larger the grant.

Municipalities can also stipulate that a certain percentage of surface area must be covered by a green roof, and that the construction meet certain minimal standards in order to qualify/receive the grant.

Alternatively, municipalities may offer low-interest or interest-free loans to help building owners meet the upfront costs of green roofs.

The difficulty with direct financial assistance is ensuring that the green roof will be maintained after construction.

Tax credits

Green roof tax credits work such that a property owner qualifies for a property tax credit if they meet a certain green roof standard.

However, without a specified time limit, tax credits could create budgetary uncertainty for the municipal government. Care should be taken to specify how long a property owner could claim this credit.

Waive fees

This measure involves the waiver of certain government fees for property owners with green roofs, such as fees that arise from applying and/or obtaining permits (i.e. permit fees).

Municipalities may be reluctant to undertake this measure as it may impact their budget.

Density bonusing

In a municipality with regulatory limits on density, the municipal government can allow the developers to adjust the zoning requirements in exchange for useful amenities, such as green roofs. For example, a municipality may allow a developer to exceed the normal limits on built floor area stipulated in the zoning by-law.

This tool costs little or nothing to a municipality. It is an incentive that does not directly offset the developer's costs but can allow them to make more income from the project.

Green roofs alone may not adequately accommodate for the increased population pressures which result from higher urban density. Thus, green roofs may need to be a part of a more comprehensive package of amenities provided by the developer in order to receive increased density capacity.

Fast-track permitting & Streamlining

Fast-track permitting involves prioritizing green roof projects over other types of development. Streamlining involves making the permit approval process more efficient through the removal of bureaucratic obstacles. Both tools allow developers to benefit financially from shorter wait times for building permits.

In most North American municipalities, streamlining the process would necessitate educating municipal staff that have limited or no experience with green roof technologies. Fast-track permitting would involve the re-allocation of resources that would otherwise go to non-green roof related projects.

Indirect Incentives

These types of regulatory tools recognize that the benefits from green roofs are connected with more common policy goals, such as reducing storm-water runoff. As such, this type of measure is a way for green roofs to be incorporated into a larger system of urban regulation. By allowing green roofs as a way to help meet these policy goals, developers will receive an incentive to construct and use green roofs.

Reduction of Utility Fees

By reducing fees regarding the use of public utilities, such as the sewer system, this tool provides an incentive for developers to implement runoff minimization technologies, such as green roofs.

Tax Breaks

Municipalities can pass on the savings from reduced pressure of public utilities in the form of tax breaks to building owners who have installed green roofs.

Regulatory Requirements

Whereas the direct and indirect incentives listed above provide benefits to developers who decide to build green roofs, regulatory measures are a way for the municipality to make green roofs a part of building standards in certain situations.

Land designations

A municipality could designate an area as allowing only certain uses to occur within the prescribed areas (i.e. inclusive zoning) or prohibiting certain uses (i.e. exclusive zoning) in order to encourage the construction of green roofs.

Permits and minimum standards

A municipality could specify in its official community plan or zoning by-law minimum standards about the development and maintenance of green roofs such that in order to get a permit or approval to build a green roof, the green roof must meet the stipulated standards. The power to adopt or create standards allows municipalities to mandate best practices in green roof construction and allows them to require certain approvals so that green roofs are in-line with the development approval process.

Landscaping requirements through a landscaping bylaw

In areas that don't require development permits, the municipality could require the enhancement of the natural environment through landscaping regulatory powers. For example, municipalities can design guidelines for buildings and landscapes that prescribe certain design features. These types of measures can apply citywide or be tailored to a specific zone or building.

Removal of inhibitive regulations

In some cases, existing regulations may inhibit green roofs. As such, the municipality could work with internal staff and other agencies to modify such regulations. One area where such action would be most useful is in relation to liaising with the province about liability and building code considerations.

Mandate compulsory green roof for public buildings

Requiring green roofs on public buildings is an easy way to set an example of the benefits of green roofs.

Other Measures

Investment

The municipality can invest in green roof or green building projects that demonstrate the feasibility of novel technologies or approaches in order to encourage innovation, for example by financially supporting demonstration and testing facilities.

Educational initiatives and public programs

Initiatives and programs run by the municipality can encourage the construction and use of green roofs by building public support for the implementation of green technology. This could involve developing knowledge-building pilot projects on municipally-owned property so that the public becomes more aware about the benefits and possibilities of green roofs.

Partnerships

Green roof initiatives require the co-operation and support of other stakeholders. Developing partnerships between home-owners, developers, engineers and community groups would strengthen a municipality's green roof initiatives.

PART III
How are Municipalities in North America Using these Tools?

This section summarizes how various North American cities are putting the aforesaid tools to work to promote the construction and use of green roofs.

Municipality	Direct Financial Incentives	Indirect Financial Incentives	Regulatory Requirements	Other
Vancouver, British Columbia, Canada	***Density Bonusing (Amenity Zoning)*** Generally, bylaws allow a base density of development that is available to everyone. However, with s. 904 of the *Local Government Act* (*LGA*), municipalities are given zoning power to implement a system whereby a density increment may be earned by providing a specified amenity.[1] For example, a green roof that creates a local microclimate, provides habitat for insects and birds, and breaks the constructed look of urban environments is likely an eligible "amenity" under this provision.[2]	***Run-off Control & Storm-water Management*** Under s. 907 of *LGA*, municipalities have the power to require those constructing paved and roof areas to manage and provide for the ongoing disposal of surface runoff and storm water, including setting maximum ratios of impermeable material.[3] For example, storm-water requirements can be performance-based, allowing a developer to select appropriate tools (e.g. green roofs) to meet the criteria.[4] At a policy level, green roofs can be promoted through "Integrated Storm-water Management Plans" and "Liquid Waste Management Plans".[5] *Combined Sewer System Fee Reduction* Local government are permitted to collect a range of fees and charges for the services that they provide. In areas with combined storm water and sanitary sewage systems (where heavy storms can carry sewage into treatment plant bypasses and directly to the environment), sewer user charge discounts can be used as a "carrot" to encourage property owners to use on-site storm water management strategies, such as green roofs.[6]	***Landscaping bylaws for buildings*** Municipalities may designate areas zoned for specific forms of development. In these areas, developing permits and building permits are required. Under s. 920 of *LGA*, development permits may include requirements respecting the character of the development (including landscaping, and the form, exterior design and finish of buildings and structures), in accordance with guidelines specified in an official community plan or zoning bylaw. Such development permit guidelines could mandate the use of green roofs.[7] Also s. 909 of *LGA* has specific regulatory powers dealing with landscaping to enhance the natural environment, which could be used to require the use of green roofs in areas not subject to development permit requirements.[8] ***Permits and minimum standards*** While development permit guidelines could mandate the use of green roofs, because the *Building Code* does not specifically mandate green roofs, there are currently no technical standards in the *Code* ensuring that these facilities are properly designed, constructed and operated.[9] Thus, local governments entering into this policy area must identify and incorporate relevant standards into their bylaws; otherwise a green roof that is earning the density bonus or the special break on municipal fees may not be doing its job.[10] This may be achieved through s. 15 of the *Community Charter*, which permits local governments to incorporate into bylaws standards and codes published by any provincial, national or international body or standards association or enacted as a law anywhere in the world.[11] ***Policies mandating green roofs*** One example of a municipal policy mandating green roofs is the City of Vancouver's South East False Creek (SEFC) Policy Statement (adopted in October 1999) which requires the installation of green roofs on at least 25% of roof areas in the City's new sustainable urban development project along the southeast shores of False Creek.[12] While the performance targets included in the 1999 policy statement were not passed as policy, since July 2004, the City has worked on developing a preliminary list of indicators and targets for SEFC that could also inform the work on the Public Investment Model.[13] For example, for storm water management, the proposed indicator was the effective impervious area (EIA – the percentage of drainage area that is directly connected to a storm drainage system) as a percentage of the total area of the site. The proposed target was 40%.[14]	***Educational initiatives and public programs*** In 2003, the Vancouver City Council approved a motion supporting the development of a "just and sustainable food system" for the City. The policy included approval of a Food Action Plan. Key activities promoted in the Action Plan include rooftop gardens.[15] In 1996, the Greater Vancouver's regional growth strategy, "The Livable Region Strategic Plan (LRSP)", was adopted by the Greater Vancouver Regional District Board. The LRSP includes four fundamental strategies, two of which directly support the expansion and promotion of urban agriculture. Another example is the City's Policy Statement for the development of the East Fraserlands which recognizes that "opportunities for edible landscaping should be pursued, on both public and private lands, where appropriate".[16] Also, the CityPlan Community Visions program provides directions for Vancouver's neighbourhood planning. Most of the neighbourhoods that have completed this program have promoted community gardens as part of the greening of parks, streets, and public spaces.[17]

Municipality	Direct Financial Incentives	Indirect Financial Incentives	Regulatory Requirements	Other
Toronto	***Financial assistance*** The Green Roof Incentive Pilot Program provides grants for approved property owners who build green roofs. The government provides $50 per square metre, up to a maximum of $10,000 for single family homes or up to $100,000 for all other property owners.[18] Due to the potential of green roofs to improve Toronto's storm water management, $200,000 has been allocated from the City's water budget to help pay for the Pilot Program.[19] Toronto Water offers grants to community groups to implement projects that will reduce storm water runoff.[20] ***Streamlining*** The City is in the process of educating City employees responsible for the approval process so that they better understand green roofs and green building techniques and can process applications more efficiently.[21]	There are no indirect incentives currently in place. However, the City is considering the introduction of storm-water management charges with forgiveness for properties with well-managed storm water, e.g. through the use of green roofs.[22]	***Mandate compulsory green roof for public buildings*** The City has committed to installing green roofs on all new city-owned buildings. When the roofs on pre-existing city buildings are due to be replaced, they will be replaced by green roofs as long as the buildings can structurally accommodate green roofs.[23] • ***Permits and Minimum*** • ***Standards*** The Province of Ontario's *Stronger City of Toronto for a Stronger Ontario Act, 2005* gives the City statutory authority to regulate private developments over and above the stipulations of the Ontario Building Code.[24] The City has chosen not to regulate at this point but is in the process of evaluating the options and will present a report in the summer of 2008.[25] On May 27th 2009 Toronto passed a green roof by-law that included a green roof construction standard and a mandatory requirement of green roofs on all classes of new buildings. The new by-law requires that up to 50 per cent of the roof be greened on multi-unit residential dwellings over six storeys, schools, non-profit housing, commercial and industrial buildings. For larger residential projects, green roofs must cover 20-50 per cent of the roof area.[26]	***Educational initiatives and public programs*** In 2004, Toronto commissioned a study by a team of researchers at Ryerson University. This study, entitled "The Environmental Benefits and Costs of Green Roof Technology", focused on the potential benefits of widespread use of green roofs in Toronto, in the context of the local environment and climate.[27] The City maintains green roofs on the City Hall Podium and Eastview Neighbourhood Community Centre for public education.[28] In February of 2008, the Toronto Botanical Gardens hosted an educational green roof conference for various stakeholders and interested members of the public.[29] ***Green building standards*** Toronto has a Green Development Standard, which includes green roofs, among other green technologies. It provides mandatory standards for City-owned buildings and optional guidelines for private developers.[30]

Municipality	Direct Financial Incentives	Indirect Financial Incentives	Regulatory Requirements	Other
Chicago	***Density Bonusing (Amenity Zoning)*** The key ordinance is *Chicago Zoning Ordinance, Article 8*: Business Districts, Section 8.5. This ordinance offers floor premiums for roofs covered with plants that reduce the urban heat island and storm-water runoff in the Central Business District. 50% of the roof area must be covered with vegetation, or a minimum of 2000 square feet (whichever is greater), to qualify for the premium. Standards for the green roof are set out in the regulation and must be met to qualify.[31]	None currently in place.	***Permits and minimum standards*** The Energy Conservation Code sets minimum standards for roof reflectivity. Green roofs have been identified as helping meet those standards.[32] ***Policies mandating green roofs*** The Building Green Roof Policy Matrix requires certain construction projects to implement green roof technologies. The policy is set out in the matrix which regulates what types of projects are subject to the policy, and what standards they must conform to.[33]	The Chicago Climate Action Plan calls for 6,000 green roofs to be built in the city by the year 2020.[34]

PART IV

How Can Municipalities in Nova Scotia Use their Law & Policy Tools to Support the Use of Green Roofs?

Municipalities are a "subordinate" level of government in that they can only do things that the federal or provincial government has expressly given them the power to do. Practically, this means that municipalities get their powers through their enabling legislation, which in HRM is the *Halifax Regional Municipality Charter* (replaced the *Municipal Government Act* in January 2009)[35]. All other municipalities in Nova Scotia follow the *Municipal Government Act*[36].

In order for municipalities in Nova Scotia to create direct and indirect incentives for the use of green roofs or to require green roofs in certain areas, the power to do so needs to exist in the *Charter*. If the power to encourage or require greens roofs is found in the *Charter*, then municipal councils can exercise those powers by virtue by adopting a resolution or policy, or enacting a by-law relating to green roofs.

Generally speaking, municipalities in Nova Scotia can enact a by-law that relates only to green roofs or they can enact by-laws about other things, such as storm water management or landscaping requirements, and include provisions about green roofs in those by-laws. A powerful planning tool that municipalities have in Nova Scotia is the creation of Municipal Planning Strategies ("MPS"). A municipality can set out policies about development and the environment in their MPS, and particularize how these policies will be applied in their land-use by-law. In the context of green roofs, this means that a municipality can say in their MPS that they want to encourage green roofs in their industrial zone and then their land-use by-law would set out what type of green roofs can be used in industrial areas and what benefits a developer gets from building a green roof.

In the table below, the powers in the *Charter* that allow municipalities to encourage or require green roofs, in the ways described in Part II and III, are explained. There are many different ways that municipalities in Nova Scotia could utilize the regulatory powers discussed below. Therefore, the examples provided serve only to highlight possible uses and should be read in the context of the examples provided in Part III.

Section of the *MGA*	**Section of the *Charter***	**What it does/How it works**	**How it could be used in relation to green roofs**
General power in the *MGA* and *Charter* to regulate Green Roofs *resolutions/policies/by-laws/municipal planning strategies*			
Resolution Policy s. 48	Resolution Policy s. 59	s. 48 (or 59) (3) allows council to adopt policies that are conducive to the effective management of the municipality.	The construction of green roofs assists with effective management of a municipality through their contribution to storm water management, improving air quality, and reducing the urban heat island effect. This power allows municipalities to create general policies promoting green roofs. A policy on green roofs could take the form of an Administrative Order or a resolution.
By-law s. 170	By-law s. 185	s. 170 (or 185) (1), (2) grants municipal councils the ability to make by-laws that only apply to specific areas of the municipality and to set different fees/ charges for different areas.	If councils can make by-laws that apply differently to different areas of a municipality, they can require buildings in certain areas of the municipality to have green roofs, such as in industrial zones.

Section of the *MGA*	**Section of the *Charter***	**What it does/How it works**	**How it could be used in relation to green roofs**
General power in the *MGA* and *Charter* to regulate Green Roofs *resolutions/policies/by-laws/municipal planning strategies*			
By-law s. 172	By-law s. 188	s. 172 (or 188) (1) sets out the subject matter that councils can regulate by by-law. In order to make a by-law relating to green roofs that does not pertain to land use planning, such as a storm water management by-law that promotes the use of green roofs, the power must be found in this provision.	Under s. 172 (or 188) (1)(a), municipalities can make by-laws about human health and well-being. Arguably, municipal councils could create a stand-alone by-law relating to green roofs as green roofs can promote human health and well-being.
By-law s. 172	By-law s. 188	s. 172 (or 188) (2)(a) gives a municipality to enact a by-law "regulates or prohibits"	This is a general provision that allows councils to regulate the use of green roofs.
Land-use By-law s. 220	Land-use By-law s. 235	s. 220 (or 235) (1), (2) allows a municipality to enact by-laws that divide their jurisdiction into zones and to list permitted uses for such zones.	Allows a municipality to enact provisions in their land-use by-laws that could encourage the use of green roofs or require green roofs.
Municipal Planning Strategy (MPS) s. 212 & s. 213 & s. 217 & s. 219	Municipal Planning Strategy (MPS) s. 227 & s. 228 & s. 229 & s. 232	s. 212 (or 227) allows municipal councils to adopt a municipal planning strategy (MPS) for all or part of the municipality. s. 213 (or 228) states that one purpose of a MPS is to provide a framework for the environmental, social and economic development of the municipality. s. 217 (or 229) states that municipalities are allowed to include statements of policy in a MPS about: (b) the physical, economic and social environment, (c) the use and development of land, (d) storm water management, (i) municipal services, (j) municipal investment for public and private development and the coordination of public programs. s. 219 (or 232) (1) states that if a MPS is adopted, a municipality cannot act in a manner that is inconsistent with the MPS.	Municipalities in Nova Scotia can adopt policy statements about green roofs into their MPS. A good example of this is Policy 6.3 of the MPS for the Central Business District of Halifax, which encourages roof top landscaping: 6.3 The City should encourage rooftop landscaping in any new developments, "which can be seen from the Citadel, from taller buildings, or from other parts of the City". If municipalities enact policy statements encouraging the use of green roofs in their MPS, they will be governed by that policy for future land use decisions. This is significant because it means that the municipality must be guided by and not act contrary to the policy statement on green roofs when considering development permit and development agreement applications.

Section of the *MGA*	Section of the *Charter*	What it does/How it works	How it could be used in relation to green roofs
General power in the *MGA* and *Charter* to regulate Green Roofs *resolutions/policies/by-laws/municipal planning strategies*			
Municipal Planning Strategy (MPS) s. 219	Municipal Planning Strategy (MPS) s. 234	s. 219 (or 234) states that if a MPS contains policies about land use and development, then a municipality must also adopt a land-use by-law amendment.	The municipality's MPS and land-use by-law work together because the policy statements in a MPS are given life through the land-use by-law. The MPS says generally what the municipality can and should do and the land use by-law says how to do it. In the context of green roofs, the MPS would say that council should encourage green roofs and the land-use by-law would set out more specifically where green roofs are allowed or required, and how they can be made.

Section of the *MGA*	Section of the *Charter*	What it does/How it works	How it could be used in relation to green roofs
		Direct Financial incentives	
Financial			
Power to spend money s. 65	Power to spend money s. 79	s. 65 (or 79) sets out a municipality's power to spend money. The allowable expenditures that could apply to green roofs are: (p) spending to prevent or decrease flooding. (m) spending to promote institutions, industries and businesses.	Trying to fit green roof development under s. 65 (or 79) (p) may be difficult because while green roofs do assist with storm water management and run-off prevention, they do not necessarily prevent/decrease flooding. Allowing a municipality to spend money on industries allows the expenditure of money to promote the green building industry, and specifically the green roof industry. This power could also be used to set up a green roof demonstration institution.
Waive fees			
s. 49	s. 60	s. 49 (or 60) (1)(c) allows a council to make policies setting and amending the fees for licenses, inspections, permits, applications and approvals.	This provision would allow municipalities to decrease the costs of green roof construction and maintenance by waiving or decreasing the fees for building/development permits where green roofs are used.
s. 220(4)(l)	s. 235(4)(n)	s. 220(4)(l) or 235(4)(n) allows land-use by-laws to prescribe fees for entering into development agreements.	A municipality could lower the fees in their land-use by-laws for entering development agreements where a development includes green roofs.

Section of the *MGA*	Section of the *Charter*	What it does/How it works	How it could be used in relation to green roofs
Direct Financial incentives			
Density Bonusing			
Land-use By-law s. 220	Land-use By-law s. 235	s. 220 (or 235) (5)(k) states that where a MPS provides, a land-use by-law can provide for incentive or bonus zoning.	A municipality can adopt a MPS with policies relating to the encouragement of green roofs. If a municipality does so, then their land-use by-law can allow for density bonusing such that municipalities trade off more density for the public amenity of a green roof.
s. 220	s. 235	s. 220 (or 235) (4) allows a municipality to enact a land-use by-law that regulates floor-area density.	Allows a municipality to regulate floor-area density in a way that encourages/requires green roofs.
Fast-track permitting & Streamlining			
s. 172	s. 188	s. 172 (or 188) (2)(e) says that in any by-law a council can provide for a system of licences, permits or approvals.	Council can create a system of licenses, permits and approvals that would allow developers to benefit financially from shorter wait times for building permits or required approvals if they included a green roof in their development.
s. 220	s. 235	s. 220 (or 235) (5)(j) states that where a MPS so provides, a land-use by-law may set out conditions, including performance standards, to be met by a development before a development permit may be issued.	Allows council to set out performance conditions and that if these conditions are met, a development permit may be issued. If a council established conditions that related to green roofs, it may speed up the permitting process.

Section of the *MGA*	Section of the *Charter*	What it does/How it works	How it could be used in relation to green roofs
Indirect Financial Incentives			
Tax Breaks			
Tax Exempt s. 71	Tax Exempt s. 89	s. 71 (or 89) (1)(b) allows municipalities to grant tax exemptions for educational organizations that provide municipal services.	If a green roof demonstration facility was established to educate the public about green roofs, the organization could receive a property tax exemption.
Water charges s. 79	Water charges s. 102	s. 79 (or 102) allows councils to prescribe charges for the provision of municipal services for persons who use or benefit from the service in a by-law.	This section allows a municipality to set water use charges. Therefore, the municipality could set lower water use charges for an owner of a green roof.

Section of the *MGA*	Section of the *Charter*	What it does/How it works	How it could be used in relation to green roofs
Indirect Financial Incentives			
Tax Breaks			
User charges s. 81	User charges s. 104	s. 81 (or 104) allows councils to make by-laws about imposing, fixing and providing methods of enforcing payment of charges for wastewater facilities or storm water systems.	This section allows municipalities to set wastewater and storm water charges. If a municipality charged fees for wastewater disposal and storm water management, they could offer discounts of these charges if a person/corporation had a green roof.
Reduction of Utility Fees			
MPS s. 214	MPS s. 229	s. 214 (or 229) (1)(d) allows a MPS to include policy statements about storm water management.	This provision would allow a municipality to make it a policy in their MPS that the use of green roofs be used to offset storm water management requirements.
Land-use By-law s. 343	Land-use By-law s. 353	s. 343 (or 353) allows councils to make by-laws regarding storm water management.	If a municipality adopted policy statements encouraging MPS to offset storm water management requirements, they could enact a by-law about storm water management that provided some benefit to owners of a green roof.
s. 227	s. 242	s. 227 (or 242) (1) allows councils to enter a development agreements that contain terms and conditions about (a) about any matter that could be covered by a land-use by-law; or (f) the construction of a storm water or wastewater system.	The provision allows municipal councils to enter development agreements that incorporate a system of green roofs as part of the development's storm water management system.

Section of the *MGA*	Section of the *Charter*	What it does/How it works	How it could be used in relation to green roofs
		Regulatory Requirements	
Permits and standards			
By-law s. 172	By-law s. 188	s. 172 (or 188) (2) states that a by-law can: (d) adopt a code or standard and require compliance with it.	This power means that a municipal council can: (i) adopt green roof standards that must be adhered to under every by-law pertaining to green roofs, or (ii) adopt green roof standards into either a stand-alone green roof by-law or a storm-water or land-use bylaw that contains green-roof related provisions. The advantage of adopting green roof standards is that it creates uniformity and ensures that green roofs are built well, built safely and maintained over the years. An example of adopting standards is the Sustainability Guidelines in the new Design Manual created by HRM By Design, that rely on LEED green building standards.
MPS s. 220	MPS s. 235	s. 220 (or 235) (5)(j) states that where a MPS provides, a land-use by-law can set out conditions, including performance standards, to be met by a development before a development permit may be issued.	The ability to set out performance standards is important because a municipality could make sure that green roofs are being built according to the best practices and being maintained by setting out clear standards.
By-law s. 172	By-law s. 188	s. 172 (or 188) (2)(e) states that councils can provide for a system of licenses, permits or approvals in any by-law.	This provision allows municipal councils to create a system of approvals for green roofs so that city engineers and building inspectors could approve green roofs based on standards that are set by the municipality.
Landscaping requirements through a landscaping bylaw			
By-law s. 220	By-law s. 235	s. 220 (or 235) (5)(c) allows councils to make land-use by-laws that regulate, require or prohibit… landscaping. s. 220 (or 235) (5)(d) allows councils to make land-use by-laws that, in connection with a development, regulate or require the planting or retention of trees and vegetation for the purposes of landscaping, buffering, sedimentation or erosion control. s. 220 (or 235) (5)(i) allows councils to make land-use by-laws to regulate the external appearance of structures.	Allows municipalities to create by-laws that can require the construction of green roofs by way of landscaping requirements. For example, if developments in certain areas are required to have a certain amount of landscaping per occupant, a by-law can require some of this landscaping to be on the roof.

Section of the *MGA*	**Section of the *Charter***	**What it does/How it works**	**How it could be used in relation to green roofs**
Mandate compulsory green roofs for public buildings			
s. 65	s. 79	s. 65 (or 79) (m) allows a municipality to spend money on the promotion and attraction of institutions, industries and businesses.	This section allows municipalities to create public demonstration green roofs and would also allow the municipality to spend money on putting green roofs on all of their buildings so that they can promote the green roof and green building industry.
s. 65	s. 79	s. 65 (or 79) (al) allows a municipality to spend money for wastewater facilities and stormwater systems.	This section would allow municipalities to spend money to create systems (i.e. green roofs) to reduce the amount of storm water effluent from the public system.
s. 220	s. 235	s. 220 (or 235) (5)(I) allows a municipality to regulate the external appearance of municipal structures through their land-use by-law.	This provision would allow municipalities to regulate the external appearance of municipally-owned structures, facilitating green roof implementation.

CONCLUSION

Municipalities across North America have begun to use their regulatory powers to proactively promote the public and private benefits of green roofing. The aim of this manual is to outline some of the law and policy tools available to municipalities in Nova Scotia to encourage the use of green roofs. This manual is not a legal opinion, but rather a discussion of options for increasing green roof cover in our communities. The hope is that the contents of this manual will enable community groups and municipalities across Nova Scotia to advance the dialogue about green roof technology and benefits. To truly increase the use of green roofs in Nova Scotia, provincial cooperation will be required to improve green roof standards and applications to the Building Code. Certain of the regulatory powers discussed in this manual are being proposed within the bonusing provisions in the new HRM By Design Downtown Halifax Secondary Planning Strategy (currently before Council – May 2009). In addition, there is currently a LEED Scorecard for the HRM By Design that gives points for vegetative roofs.

Over fifty green roofs are already known to exist in HRM and more are being constructed in residential and commercial areas across the province each year. Emerging green roof research and overall interest in sustainable building technologies at local universities and colleges (Saint Mary's, Dalhousie, Nova Scotia Community College) and community groups (Ecology Action Centre) is set to greatly increase our understanding of the green roof public and private benefits that apply within our climate (as discussed in Part I). Community involvement, quantitative research and application, as well as support for green roofs at the municipal and provincial level are all required for Nova Scotia to maintain its role as a leader in urban ecological and sustainability issues within the Maritimes and across North America.

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